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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/888,762	06/25/2001	Yonina C. Eldar	0492611-0395(MIT 9170)	9398
7590 CHOATE, HALL & STEWART LLP Two International Place Boston, MA 02110			EXAMINER BURD, KEVIN MICHAEL	
			ART UNIT 2611	PAPER NUMBER
			MAIL DATE 10/10/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

09/888,762

**Applicant(s)**

ELDAR ET AL.

**Examiner**

Kevin M. Burd

**Art Unit**

2611

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 25 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 9-17, 19, 20, 22, 23, 25-29, 33-38, 40, 42, 43, 45, 46 and 48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9-17, 19, 20, 22, 23, 25-29, 33-38, 40, 42, 43, 45, 46 and 48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

1. This office action, in response to the request for continued examination (RCE) filed 9/25/2008, is a final office action.

***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/25/2008 has been entered.

3. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

### ***Response to Arguments***

4. Applicant's arguments filed 9/25/2008 have been fully considered but they are not persuasive. Regarding the rejection of the claims under 35 USC 102(b) as anticipated by Bottomley, applicant states Bottomley does not disclose a second vector output which is substantially uncorrelated on at least a subspace. The examiner disagrees. As stated in the previous office action, the receiver comprises means for correlating the received signal and a means for decorrelating the received signal to solve for at least one transmitted information symbol sequence as stated in claim 10. The decorrelation means is the correlation shaper. The decorrelation means will output a second vector and that output will be substantially uncorrelated (decorrelated) on at least a subspace. The decorrelation means utilizes a MMSE technique. By minimizing the mean square error, the decorrelation process can be enhanced (column 16, lines 34-36). For this reason and the reasons stated in the previous office action, all the limitations of the claimed invention are taught by the reference and the rejection of the claims is maintained.

Regarding the rejection of the claims under 35 USC 102(b) as anticipated by Fukawa, applicant states Fukawa does not disclose a bank of correlators cross-correlate the received signal with a set of signals to produce a vector output and

wherein the set of signals is determined by minimizing the least-squares error between the set of signals and the set of signature signals. The examiner disagrees. The set of signature signals are the short code signals used to spread the data signals. These signature signals (short code signals) are combined with the data signals and the spread data signals undergo some distortion during transmission to the receiver. The bank of correlators, correlate the received signal with a set of signals (short code) to recover the individual user data signals to produce an output. This correlation is shown in figures 15 and 18. The set of signals are identical to the set of signature signals. The mean square of the error signal is minimized following the LMS algorithm (column 19, lines 43-67). As stated previously, the set of signals are not a component of the receiver since signals used to despread a received signal are not components of an apparatus. The type of signals used to despread the received signal does not require a specific step to be performed. For these reasons and the reasons stated in the previous office action, the rejection of the claims is maintained.

Regarding the rejection of claim 3 under 35 USC 103(a) as unpatentable over Bottomley in view of the admitted prior art, Bottomley teaches the claimed limitations and it would have been advantageous to combine the teachings of the admitted prior art for the reason stated in the previous office action. For these reasons and the reasons stated in the previous office action, the rejection of the claim is maintained.

Regarding the rejection of the claims under 35 USC 103(a) as unpatentable over Bottomley in view of Farsakh, applicant states the prior art does not disclose wherein the correlation shaper is chosen so that a covariance matrix of the second output vector

in the space in which it lies has the property that the second and subsequent rows are permutations of the first row. The examiner disagrees. Farsakh discloses generating a covariance matrix and averaging the covariance matrix to improve the estimated value of the spatial covariance matrix (column 5, line 65 to column 6, line 5). The rows of the matrices are dependent on the other rows of the matrices and therefore are permutations of the rows. For this reason and the reasons stated in the previous office action, the rejection of the claims are maintained.

The provisional double patenting rejection of the claims is maintained.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 5, 8-11, 21, 23, 24, 27, 28 and 39-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Bottomley (US 5,506,861).

Regarding claim 1, 4, 5 and 9-11, Bottomley discloses receivers each shown in figures 8-11. The receiver comprises a correlation demodulator where the demodulator has a plurality of correlators (801 in figure 8). Each of the correlators outputs a correlation signal. The outputs of the correlator are input to a correlation shaper (decorrelator). Claim 10 describes the receiver for demodulating comprising the correlator and decorrelator. The decorrelator is shown in figure 4 and figure 9. The

decorrelator is described in column 5, lines 7-22. The vector of correlation values is multiplied by a decorrelation matrix to transform the signals. Bottomley discloses minimum mean square estimation (MMSE) techniques are applied to enhance the decorrelation process (column 16, lines 33-47).

Regarding claim 2, the known signature sequence is matched to the input (column 3, lines 39-42).

Regarding claim 26, Bottomley further discloses a bank of complex multipliers 804 and a metric processor 806 in figure 8.

Regarding claims 27-29, 33 and 34, Bottomley discloses a method of processing signals received by one of the receivers each shown in figures 8-11. The receiver comprises a correlation demodulator where the demodulator has a plurality of correlators (801 in figure 8). Each of the correlators outputs a correlation signal. The outputs of the correlator are input to a correlation shaper (decorrelator). Claim 10 describes the receiver for demodulating comprising the correlator and decorrelator. The decorrelator is shown in figure 4 and figure 9. The decorrelator is described in column 5, lines 7-22. The vector of correlation values is multiplied by a decorrelation matrix to transform the signals. Bottomley discloses minimum mean square estimation (MMSE) techniques are applied to enhance the decorrelation process (column 16, lines 33-47).

6. Claims 14-17, 19, 20, 22, 23, 25, 37, 38, 40, 42, 43, 45, 46 and 48 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukawa et al (US 5,790,588).

Regarding claim 14, Fukawa discloses a receiver shown in figure 16. The receiver comprises a bank of correlators (figure 15) that receives a signal that is a linear combination of a set of signals. The signal is spread with a number of spreading codes (figure 14). The mean square of the error signal is minimized following the LMS algorithm (column 19, lines 43-67).

Regarding claims 15-17, 19, 20, 22, 23 and 25, the signals are not a component of the receiver. MPEP 2111.04 states claim scope is not limited by claim language that does not limit a claim to a particular structure.

Regarding claim 37, Fukawa discloses a method for processing signals received in a receiver shown in figure 16. The receiver comprises a bank of correlators (figure 15) that receives a signal that is a linear combination of a set of signals. The signal is spread with a number of spreading codes (figure 14). The mean square of the error signal is minimized following the LMS algorithm (column 19, lines 43-67).

Regarding claims 38, 40, 42, 43, 45, 46 and 48, Fukawa discloses the signals are orthogonal (column 11, lines 38-57). In addition, the signals are not a component of the receiver. MPEP 2111.04 states claim scope is not limited by claim language that does not limit a claim to a particular structure.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the



invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley (US 5,506,861) in view of the instant application's disclosed prior art (specifically paragraph 0004).

Regarding claims 3, Bottomley discloses the receiver stated above. Bottomley does not disclose the correlators are matched filters. The instant application's disclosed prior art states, in paragraph 0004, CDMA receivers use matched filter receivers that try to mitigate the effect of multiple signature signal interference and background noise. It would have been obvious for one of ordinary skill in the art at the time of the invention to use the matched filter receiver of the instant application's disclosed prior art in the bank of correlators disclosed by Bottomley.

8. Claims 12, 13, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley (US 5,506,861) further in view of Farsakh (US 6,317,612).

Regarding claims 12 and 35, Bottomley discloses the receiver stated above in paragraph 5. Bottomley does not disclose shaping the correlation by performing a transformation on the output so that the covariance matrix has the property that the second row is a permutation of the first row. Farsakh discloses a method for estimating spatial parameters of transmission channels by estimating a spatial covariance matrix. The correlating step is carried out for each sampling time for each subscriber station thereby generating a predetermined number of special covariance matrices for each subscriber station and the correlating step further comprises averaging the covariance

matrices generated for each subscriber station to provide an improved estimated value of the spatial covariance matrix specific to each subscriber station (column 5, line 65 to column 6, line 5). The rows of the matrices are dependent on the other rows of the matrices. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the receiver of Bottomley with the teachings of Farsakh to increase capacity in mobile communication systems (column 1, lines 43-48).

Regarding claim 13 and 36, Bottomley discloses minimum mean square estimation (MMSE) is done in the decorrelation process (column 16, lines 33-47).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 14, 15, 16, 17, 19, 20, 22, 23, 25, 37, 38, 40, 43 and 46 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 13, 13, 16, 15, 16, 17, 18, 19, 20, 31, 31, 33, 35 and 37 respectively of copending Application No. 09/788,890. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed set of signature signals are the predetermined set of signals. The claims are not identical since the predetermined set of signals is a broader term than the signature set of signals. However, to correlate the signals, a known set of signals is necessary.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Conclusion***

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin M. Burd/  
Primary Examiner, Art Unit 2611  
10/3/2008